Problem Set 1

1. Multiply the expressions given below.

   a) $(x^2 + 5)(x^2 - 3)$

   d) $(3x + 2)(x^2 - x - 2)$

   g) $(x - 2)^3$

   b) $(2a - 3)(2a + 3)$

   e) $(2a - 3)(4a^2 + 6a + 9)$

   h) $\left(x + \dfrac{1}{x}\right)^2$

   c) $(3x - 5)^2$

   f) $(x + y)(x^2 - xy + y^2)$

   i) $\left(a^5 - \dfrac{1}{a^5}\right)^2$

2. Solve each of the following equations. Make sure to check your solutions.

   a) $\dfrac{3}{4}(x + 12) = -29 - \dfrac{2}{3}(x - 6)$

   c) $11 - (x - 3)(2x + 5) = -2(x - 3)^2$

   b) $\dfrac{x + 7}{2} = \dfrac{x - 4}{3} - \dfrac{3x - 1}{4}$

   d) $2(3x - 1) - 5(2x + 1) = -7(x + 1)$

3. Find an equation of the straight line passing through the points $(-6, 6)$ and $(2, 2)$.

4. A straight line passes through points $(a, 0)$ and $(0, b)$, where $a, b \neq 0$. Prove that the line has the following equation:
$$bx + ay = ab$$

5. Solve each of the following word problems.

   a) A farmer has some chickens and cows. One day he was asked: "*How many chickens and how many cows do you have?*" His answer was: "*All together, there are* 73 *heads and* 188 *legs*". How many chickens and how many cows does the farmer have?

   b) A total of \$20 000 is to be invested in bonds and stocks. If the amount invested in bonds is to be \$4500 more than the amount invested in stocks, how much money is invested in each category?

   c) Sally worked 50 hours last week and made \$495 for the week. For every hour worked over 40 her job pays time and a half. What is Sally's regular hourly pay rate?

6. Banks X and Y offer slightly different business checking accounts. Bank X charges \$ 10 per month for the account and then 12 cents for every check cashed. Bank Y charges \$ 14 per month for the account and 10 cents for every check cashed.

   a) Which deal is better if we cash 85 checks per month? Explain your answer.

   b) Which deal is better if we cash 300 checks per month? Explain your answer.

   c) If we cash n checks in a month, the two offers are identical. Find the value of n.

7. A bus travels between cities A and B. The distance between these cities is 60 miles. It takes the bus 2 hours to get from A to B. On its way back, the traveling time was only 1.5 hours. Find the average speed of the bus for

   a) the trip from A to B   b) the trip from B to A   c) for the roundtrip